

What is claimed is:

1. A diagnostic plasma measurement probe, comprising:
 - a) a primary substrate;
 - b) an electrical interconnection layer disposed upon the primary substrate;
 - c) at least one sensor for measuring properties of a plasma environment disposed upon the primary substrate; and
 - d) an electronics module disposed upon the primary substrate and electrically connected to the at least one sensor through the electrical interconnection layer.
- 10 2. The diagnostic plasma measurement probe of claim 1, further comprising a passivation layer that protects the interconnection layer from the plasma environment.
3. The diagnostic plasma measurement probe of claim 1 wherein the primary substrate is a silicon wafer with dimensions corresponding substantially to standard semiconductor starting materials.
- 15 4. The diagnostic plasma measurement probe of claim 1 wherein the electronics module comprises electronic components disposed upon a module substrate.
5. The diagnostic plasma measurement probe of claim 4 wherein the electronics module is electrically connected to the at least one sensor by wirebonding to the electrical interconnection layer.
- 20 6. The diagnostic plasma measurement probe of claim 4 wherein the electronics module is electrically connected to the at least one sensor by direct bonding to the electrical interconnection layer.
7. The diagnostic plasma measurement probe of claim 6 wherein the direct bonding of the electronics module to the electrical interconnection layer mechanically bonds the electronics module to the primary substrate.
- 25 8. The diagnostic plasma measurement probe of claim 4 wherein the electronics module further comprises a housing hermetically sealed to the module substrate.
9. The diagnostic plasma measurement probe of claim 8 wherein the hermetically sealed housing isolates the electronic components from the plasma environment.

10. The diagnostic plasma measurement probe of claim 8 wherein the housing comprises a Faraday shield to isolate the electronic components from radiative noise.

11. The diagnostic plasma measurement probe of claim 4 wherein the electronics module is sealed with an encapsulant to isolate the electronic components from the plasma environment.

5 12. The diagnostic plasma measurement probe of claim 11, further comprising confinement ridges that constrain the flow of the encapsulant during cure.

13. The diagnostic plasma measurement probe of claim 11, further comprising a conductive layer disposed upon the encapsulant to isolate the electronic components from radiative noise.

10 14. The diagnostic plasma measurement probe of claim 1 wherein the electronics module comprises electronic components disposed upon the electrical interconnection layer.

15. The diagnostic plasma measurement probe of claim 1 wherein the electronics module comprises one or more application specific integrated circuit devices.